An Empirical Study of Labour's Share in Income for Australia

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ABSTRACT

Economists have long been studying the shares of labour and capital in income. Surprisingly, no such empirical studies exist for Australia. This paper looks at a number of variables that can affect labour's share in income: unemployment, capacity utilisation, growth rate of GDP and changes in the price level. Our study finds that the wage share is inversely related to unemployment, capacity utilisation and the growth rate of GDP but positively related to changes in prices.

JEL Codes: C22, J30

1. INTRODUCTION

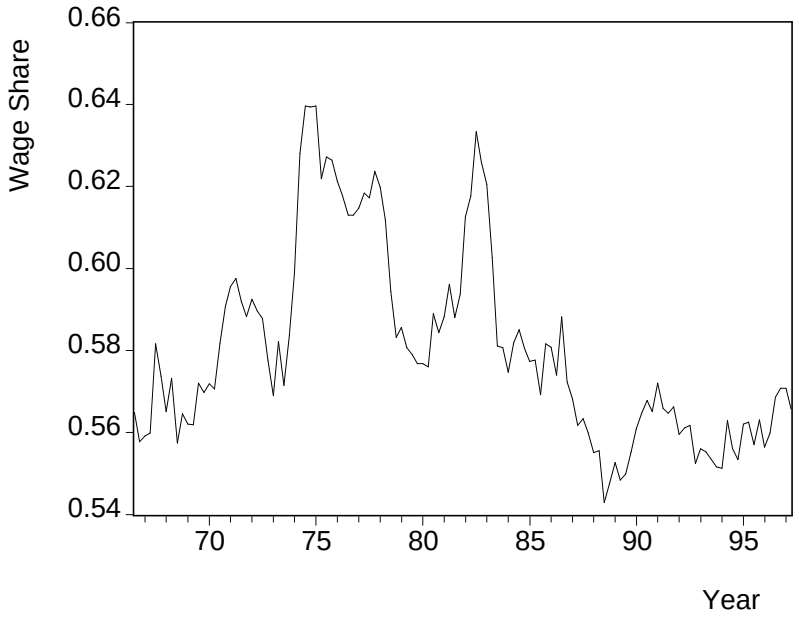
The distribution of income between labour and capital has been of central concern for economists for a long period of time. Although the impact of macroeconomic fluctuations on the distribution of income is not new, much of the research has investigated the impact that these fluctuations have on the overall distribution of income. For example, Blinder and Esaki (1978) and Blank and Blinder (1986) study the effects of inflation and unemployment on the distribution of income. Mirer (1973) develops a model that focuses on the mechanism by which factor incomes are allocated amongst families in a market economy. Feenstra and Hanson (1997) examine the impact of capital inflows on wage inequality.

The objective of our paper is to focus on the movement of labour share over the last three decades by employing recent advances in time series techniques. Surprisingly, there has been no empirical study undertaken on labour share in Australia.

In Figure 1 we can see that the wage shocks in Australia in the early 1970s culminated in labour's share in income being approximately 6.5 per cent higher than during the 6 years prior to the wage shocks. The increased income share persisted well above its pre-shock levels until the late 1980s. The return of labour's income share to its pre-shock level reflects the

implementation of the Prices and Income Accord and the wages pause in Australia.

Figure 1. Wage Share for Australia, 1966: Q3-1997: Q2



Previous empirical studies in this field on other countries have not paid adequate attention to the issue of stationarity of the variables. Thus, as Granger and Newbold (1974) and Phillips (1986) show, it is possible that these studies estimate spurious regressions. In this study, we will test the stationarity of the time series before estimation.

2. REVIEW OF THE THEORETICAL AND EMPIRICAL LITERATURE

In terms of distribution theory, neo-classical economics has inherited from their classical forebears, namely Ricardo, the concept of a "functional" distribution of income amongst privately owned inputs into the production process: capital receives its profit, land receives its rent, and labour receives its wages (Lydall, 1979). However, unlike classical economists, capitalists and labour receive a *mix* of wage and property income, as opposed to being distinct classes of individuals. In contrast, Marxist economics associate productive assets with distinct classes of individuals. As a result, the constant struggle between capital and labour in capitalist societies is the driving force behind social change (Wright, 1978).

Neo-classical research and theory have focused on short- run variations in two components of labour share: wages and productivity. Neo-classical theory predicts that productivity is countercyclical because of the law of diminishing marginal returns (Bernanke and Powell, 1986; Geary and Kennan, 1982). Because labour is paid the value of its marginal product, real wages must also be countercyclical. Keynes (1936) originally embraced this postulate that real wages moved countercyclically but was later convinced by Dunlop's (1938) and Tarshis's (1939) evidence that real

wages move pro-cyclically (Keynes, 1939). Most recent studies have found that real wages move procyclically, that is, output per worker increases during cyclical upturns (Bils, 1985; Schor, 1985; Rayack, 1987).

Empirical studies on labour share have included Kaldor (1956), Kalecki (1971), Thirwall (1972), Weisskopf (1979), Moseley (1987) and Islam (1988). In his seminal paper Weisskopf (1979) identified three theoretical hypotheses for the decline in the rate of profit: income share with the "reserve army of labour" or "rising strength of labour", the capacity utilisation rate with "realisation failure" and the capacity-capital ratio with the "rising organic composition of capital." Henley (1987) extends Weisskopf's work on the rate of profit. Henley finds that a continued downward pressure on profitability is explained by capacity utilisation, in contrast to Weisskopf's explanation of rising labour share. Raffalovich, Leicht and Wallace (1992) test several hypotheses regarding the impact of macroeconomic performance on the distribution of income between labour and capital in the United States during the period from 1950 to 1980. Munley (1981), Hahnel and Sherman (1982a, 1982b), Moseley (1985, 1987) also extend the work of Weissskopf's work on the rate of profit. More recently, Blanchard (1997) examined the wage and profit rates since 1970 in

fourteen member countries of the Organisation for Economic Co-operation and Development (OECD).

In this paper, we test the following three hypotheses on labour's share in income for Australia: the "overhead labour" hypothesis, the "reserve army of labour" hypothesis and the "realisation theory" of crisis hypothesis or "wage lag" hypothesis. These three hypotheses are explained below.

The "overhead labour" hypothesis was incorporated into neoclassical theory to take account of these empirical regularities (Costrell, 1981-82; Bernanke and Powell, 1986). This hypothesis asserts that production labour is employed in proportion to output, whilst managerial labour is employed in proportion to its capacity utilised. Therefore, during an economic downturn when industrial capacity is not fully utilised, the proportion of high wage managerial labour among the employed increases (this is analogous to the general "labour hoarding" hypothesis). Average labour income increases and average productivity decreases thus increasing labour's share of income (Weisskopf, 1979; Hahnel and Sherman 1982a, 1982b). As a result, labour's income share is expected to be inversely related to capacity utilisation.

The "reserve army of labour" hypothesis confers an advantage on capital (labour) whenever the unemployment rate rises above (falls below) a

"natural" level. It is the decline in the rate of profit (and thus a fall in investment) that leads to an increase in the unemployment rate. This is analogous to the "rising strength of labour" hypothesis which asserts that an economic expansion increases the wage rate by increasing the bargaining power of production labour. As the unemployment rate declines, wages increase faster than productivity and these wage gains are not offset by increases in the prices of consumer goods. Therefore, labour's income share is expected to be inversely related to the unemployment rate.

The "realisation failure" theory of crisis attributes the fall in the rate of profit to the overproduction of commodities and as a consequence, there is an accumulation of unsold inventories which leads to a fall in the rate of profit. The distributional variant of this hypothesis is the "wage lag" hypothesis (Hahnel and Sherman, 1982a, 1982b) which asserts that increases in wages lag behind increases in productivity and national income during an expansionary phase. Thus, the wage share falls. Conversely, during a contractionary phase, unions gather public support to hinder real wage cuts. Thus, the wage share rises. Therefore, labour's income share is expected to be inversely related to the growth of output. In addition, we also use the inflation rate to control for prices. Consistent with the wage lag hypothesis, inflation increases output prices at a faster rate than wages.

3. DATA SOURCES

We use deseasonalised quarterly data for the period from the 3rd quarter of 1966 to the 2nd quarter of 1997. The data sources are as follows. WAGSH measuring the wage share (compensation of employees as a percentage of GDP) is from the NIF database. UNEMP (again from the NIF database) measures the (total) unemployment rate. GRGDP is the growth rate of GDP (in 1990 prices) and the data are from the *International Financial Statistics* (CD-ROM version, April 1998) of the International Monetary Fund. Since we employ quarterly data, we define GRGDP as follows:

GRGDP = [{GDP-GDP(-4)}/GDP(-4)]x100. CAPUT measures the capacity utilisation and is from the ACCI Westpac survey data from "Survey of Industrial Trends". PCHANG stands for changes in CPI and the data are also from *International Financial Statistics*.

4. ECONOMETRIC METHODOLOGY

Before we proceed with the time series analysis, we must first test for stationarity of the variables. We use the augmented Dickey-Fuller (ADF) tests (see Dickey and Fuller (1979) and (1981)) for stationarity. This is done for the full sample (without a structural break), for the sub-sample

from the 3rd quarter of 1966 to the 2nd quarter of 1973, for the sub-sample from the 3rd quarter of 1973 to the 2nd quarter of 1997 and finally for the full sample with a structural break in the 3rd quarter of 1973. We adopt Perron's methodology (1989) who challenges the findings of Nelson and Plosser (1982). Perron argues that the Nelson and Plosser study is flawed because it does not take into account structural breaks.

The tests for stationarity are followed by the cointegration tests. We use a Johansen (1991) framework of cointegration. The general form of the vector error correction model is given by:

$$\Delta y_t = a_{oy} + a_{1y}\, t - \Pi_y\, z_{t-1} + \sum_{i=1}^{p-1} \Gamma_{iy} \Delta z_{t-i} + \Psi_y w_t + e_t, \quad t=1,2,.....n \qquad (1)$$

where $z_t = (y_t', x_t')'$, y_t is an m_y x 1 vector of endogenous variables I(1) variables and w_t is a q x 1 vector of exogenous/deterministic variables I(0) variables.

5. EMPIRICAL RESULTS

The results of the ADF tests on the levels and first differences of the variables for the whole sample are given in tables 1 and 2. We use the Akaike information criterion (AIC) for determining the lags. The results indicate that GRGDP is stationary in its level. Other variables (namely,

WAGSH, PCHANG, UNEMP and CAPUT are non-stationary in their levels but stationary in their first differences. Thus, we can proceed with the cointegration tests in the Johansen framework where GRGDP is treated as an exogenous variable. For the cointegration tests, the number of lags was determined by using the AIC. The results are in table 3. The results indicate that the variables are not cointegrated when we use critical values at the 95% level.

Table 1. Augmented Dickey-Fuller Tests (Full Sample)

Variable	Test Statistic	Critical Value
WAGSH	-2.9058(4)	-3.4504
PCHANG	-3.0928(4)	-3.4519
UNEMP	-2.5967(4)	-3.4504
CAPUT	-2.8313(1)	-3.4504
GRGDP	-3.9429(4)*	-2.8884

Note: Lags in parentheses are determined using the Akaike Information Criterion (AIC). The number of observations is kept constant at various lags. The critical values are at the 5% level.
*denotes no trend (all other variables have trends).

Table 2. Augmented Dickey-Fuller Tests (Full Sample)

Variable	Test Statistic
ΔWAGSH	-6.0711(3)
ΔPCHANG	-5.8156(3)
ΔUNEMP	-4.6861(3)
ΔCAPUT	-12.550(0)
ΔGRGDP	NA

Note: Lags in parentheses are determined using the Akaike Information Criterion (AIC). The number of observations is kept constant at various lags. The critical value at the 5% level is -2.8877. None of the variables are trended.

Table 3. Johansen Multivariate Cointegration Tests (Full Sample)

Maximal Eigenvalue Tests			
Null	Alternative	Test Statistic	Critical Value*
r =0	r=1	16.5634	28.2700
r <=1	r=2	10.9436	22.0400
Trace Tests			
r=0	r>=1	40.3346	53.4800
r <=1	r=2	23.7711	34.8700

Note: The cointegration tests are for WAGSHA, PCHANG, CAPUTIL, UNEMP and GRGDP. The first four variables are I(1) and the last variable is I(0) respectively. The lag order is five and was determined by using the Akaike Information Criterion (AIC).
*critical values are for the 95% quantile.

Next, we conduct the ADF tests for the sub-sample from the 3rd quarter of 1966 to the 2nd quarter of 1972. The results for the levels and the first differences of the variables are in table 4. The results indicate that all variables are non-stationary in their levels. However, the results for the first differences indicate that while the first differences of UNEMP, CAPUT and GRGDP are stationary, the first differences of WAGSHA and PCHANG are not. Thus, we do not proceed with the cointegration tests in this case.

Table 4. Augmented Dickey-Fuller Tests (1966Q3 to 1973Q2)

Variable	Test Statistic	Variable	Test Statistic
WAGSH	-2.2257(0)	ΔWAGSH	-1.6144*(4)
PCHANG	-2.9844(2)	ΔPCHANG	-2.0214*(0)
UNEMP	-2.1307(0)	ΔUNEMP	-5.1755*(0)
CAPUT	-2.9375(4)	ΔCAPUT	-3.2406*(0)
GRGDP	-0.8500*(4)	ΔGRGDP	-7.2159*(3)

Note: Lags in parentheses are determined using the Akaike Information Criterion (AIC). The number of observations is kept constant at various lags. The critical value for the variables at their levels at the 5% level is -3.6219 except for GRGDP. For GRGDP, it is -3.0294. For the variables in their first differences, the critical value at the 5% level is -3.0039.
*denotes no trend.

The results of the ADF tests on the levels and first differences of the variables for the period from the 3rd quarter of 1973 to the 2nd quarter of 1997 are in table 5. The results indicate that WAGSHA, PCHANG and GRGDP are stationary in their levels while UNEMP and CAPUT are stationary in their first differences. Thus, the cointegration tests are not appropriate.

Table 5. Augmented Dickey-Fuller Tests (1973Q3 to 1997Q2)

Variable	Test Statistic	Variable	Test Statistic
WAGSH	-3.4613(4)	ΔWAGSHA	NA
PCHANG	-4.2176(4)	ΔPCHANG	NA
UNEMP	-3.0023(4)	ΔUNEMP	-4.4311*(3)
CAPUT	-3.1168(0)	ΔCAPUT	-12.235*(0)
GRGDP	-4.2581*(7)	ΔGRGDP	NA

Note: Lags in parentheses are determined using the Akaike Information Criterion (AIC). The number of observations is kept constant at various lags. The critical value for the variables at their levels at the 5% level is -3.4566 except for GRGDP. For GRGDP, it is -2.8915. For the variables in their first differences, the critical value at the 5% level is -2.8915.
*denotes no trend.

Next, we take into account a structural break into account in our analysis. The plots of our data indicate a structural break around the 3rd quarter of 1973. So, we use the full sample and take into account the structural break. The results of the unit root tests on the levels and first differences of the variables are in table 6. The results indicate that while UNEMP and GRGDP are stationary in their levels, all other variables are stationary in their first differences. Thus, we can proceed with the cointegration tests by treating UNEMP and GRGDP as exogenous variables. The results of the cointegration tests are in table 7. The results indicate that the variables are cointegrated and the number of cointegrated vectors is equal to one. The long run cointegrating vector is in table 8. The coefficients are normalised on WAGSH. The results indicate that WAGSH is positively related to PCHANG but negatively related to CAPUT. It is important that we study the relationship between the wage share and unemployment. In order to establish the relationship, we regress Δ WAGSHA on ΔUNEMP, ΔCAPUT, and ΔPCHANG where Δ denotes change (first difference). These variables are found to be stationary. In our regression, we include a dummy to take into account the structural change. The results of the Cochrane-Orcutt AR(2) method are in table 9. The

results indicate that the change in WAGSH is negatively related to the changes in CAPUT, UNEMP and GRGDP but positively related to the price index. However, only the coefficient on the GRGDP is significant at the 5% level.

Table 6. Augmented Dickey-Fuller Tests (Full Sample with a Structural Break)

Variable	Test Statistic		Test Statistic
WAGSH	-3.1911(0)	ΔWAGSH	-6.5280*(3)
PCHANG	-3.5582(4)	ΔPCHANG	-6.0948*(3)
UNEMP	-3.7832(2)	ΔUNEMP	NA
CAPUT	-3.3174(0)	ΔCAPUT	-12.744*(0)
GRGDP	-4.1424(4)	ΔGRGDP	NA

Note: Lags in parentheses are determined using the Akaike Information Criterion (AIC). The number of observations is kept constant at various lags. The critical value for the variables at their levels at the 5% level is -3.76.
*denotes no trend.

Table 7. Johansen Multivariate Cointegration Tests (Full Sample with a Structural Break)

Maximal Eigenvalue Tests			
Null	Alternative	Test Statistic	Critical Value*
r =0	r = 1	39.0487**	22.0400
r <=1	r= 2	10.9778	13.8100
Trace Tests			
r=0	r> =1	54.9470**	34.8700
r <=1	r =2	15.8983	20.1800

Note: The cointegration tests are for WAGSH, PCHANG, CAPUTIL, UNEMP and GRGDP. The first three variables are I(1) and the last two variables are I(0) respectively. The lag order is four and was determined by using the Akaike Information Criterion (AIC).
*critical values are for the 95% quantile.
**denotes significance at the 5% level.

Table 8. Long Run Cointegrating Vector (Full Sample With a Dummy)

WAGSH	-1.0000
PCHANG	0.0233
CAPUT	-0.0005

Note: The coefficients are normalized on WAGSH. The exogenous variables are UNEMP and GRGDP.

Table 9. Regression Results using Cochrane-Orcutt Method AR(2) for the Full Sample using a Structural Break

Variable	Coefficient	T ratio
ΔPCHANG	0.000882	1.3170
ΔUNEMP	-0.003243	-1.2350
ΔCAPUT	-0.000001	-0.0197
GRGDP	-0.000934	-2.1374*
Constant	0.006156	1.8940
$R^2 = 0.08$		

*denotes significance at 5% level.

6. CONCLUSION

In this paper, we test three hypotheses regarding labour's share in Australia using recent time series econometric techniques. We relate labour's share to unemployment, capacity utilisation, price change and the growth rate of GDP. Our results indicate that the labour's share is negatively related to the growth rate of GDP, capacity utilisation and unemployment but positively related to price change. Our evidence

confirms the “overhead labour” hypothesis, the “reserve army” hypothesis and the “wage lag” hypothesis.

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